470178

FLOOD INSURANCE STUDY

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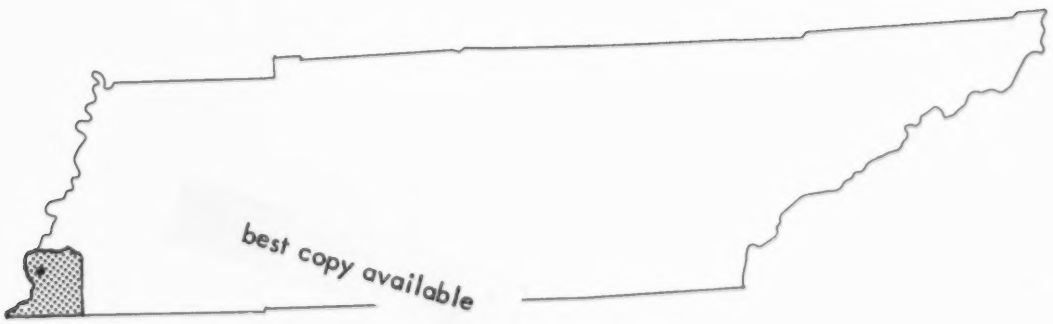
CITY OF MILLINGTON, TENNESSEE
SHELBY COUNTY



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SEPTEMBER 16, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 470178

FEM 1209

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PUBLISHED SEPERATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CITY OF MILLINGTON, TENNESSEE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Millington, Shelby County, Tennessee, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Millington to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Memphis District, for the Federal Insurance Administration, under Interagency Agreement No. H-7-76, Project Order No. 12. This study was completed in December 1979.

1.3 Coordination

Community base map selection and the identification of streams requiring detailed study were done in a meeting attended by personnel of the U.S. Army Corps of Engineers (COE), FIA, and Millington City officials in April 1975. A public notice announcing the intent to perform a flood elevation study was published in "The Commercial Appeal" on the 8th, 15th, and 22nd of April 1976 and "The Millington-Shelby Star" on the 15th, 22nd, and 29th of April 1976. This notice asked the public to bring any relevant facts and technical data concerning local flood hazards to the community Chief Executive Officer. Letters were sent to various State, Federal, and private agencies informing them of the forthcoming insurance study and requesting any pertinent information available. Field interviews with local residents were conducted to help define flood hazard areas within Millington and validate theoretical analysis. On April 1, 1980, the results of the work performed by the COE were presented to the FIA and Millington City officials at a final coordination meeting.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Millington, Tennessee, and some selected stream reaches outside the corporate limits as determined by FIA representatives and city officials. The area of study is shown on the Vicinity Map (Figure 1).

The entire area was studied in detail and includes Big Creek Drainage Canal, Royster Creek, North Fork Creek, North Fork Creek Lateral A, and Casper Creek. All these streams are in the Loosahatchie River Basin.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through December 1984.

2.2 Community Description

The City of Millington is located in north-central Shelby County, Tennessee, about 8 miles north of Memphis. The most current population figure for Millington is about 21,000, including personnel of the Naval Air Station and Training Command. The average temperature is 60.5 degrees F with an average rainfall of about 53 inches. Originally settled as an agricultural community in 1877, Millington is now best known as the home of the nation's largest inland Naval Complex, Naval Air Station (NAS), Memphis. NAS, Memphis, contains 23 independent U.S. Navy and Marine Corps commands and activities.

The flood plain of Big Creek Drainage Canal consists of land used for agricultural, residential, and commercial purposes. The flood plain of North Fork Creek, which flows through the center of Millington, is primarily occupied by residential and commercial development. Development in the primarily agricultural flood plains of Royster and Casper Creeks consists of scattered residential areas.

2.3 Principal Flood Problems

The history of flooding in Millington indicates that flooding may occur during any season of the year. The majority of floods, however, have occurred during the winter and spring.

Heavy development in the flood plains of Big Creek Drainage Canal, North Fork Creek, and North Fork Creek Lateral A contribute to the increasing flood damages experienced in Millington. As urbanization increases in the watersheds, runoff becomes more intense for a given rainfall. Also, improperly elevated structures adjacent to streams and drainage outlets encourages flood damage. The proper design, operation, and maintenance of drainage facilities becomes more critical with development saturation.

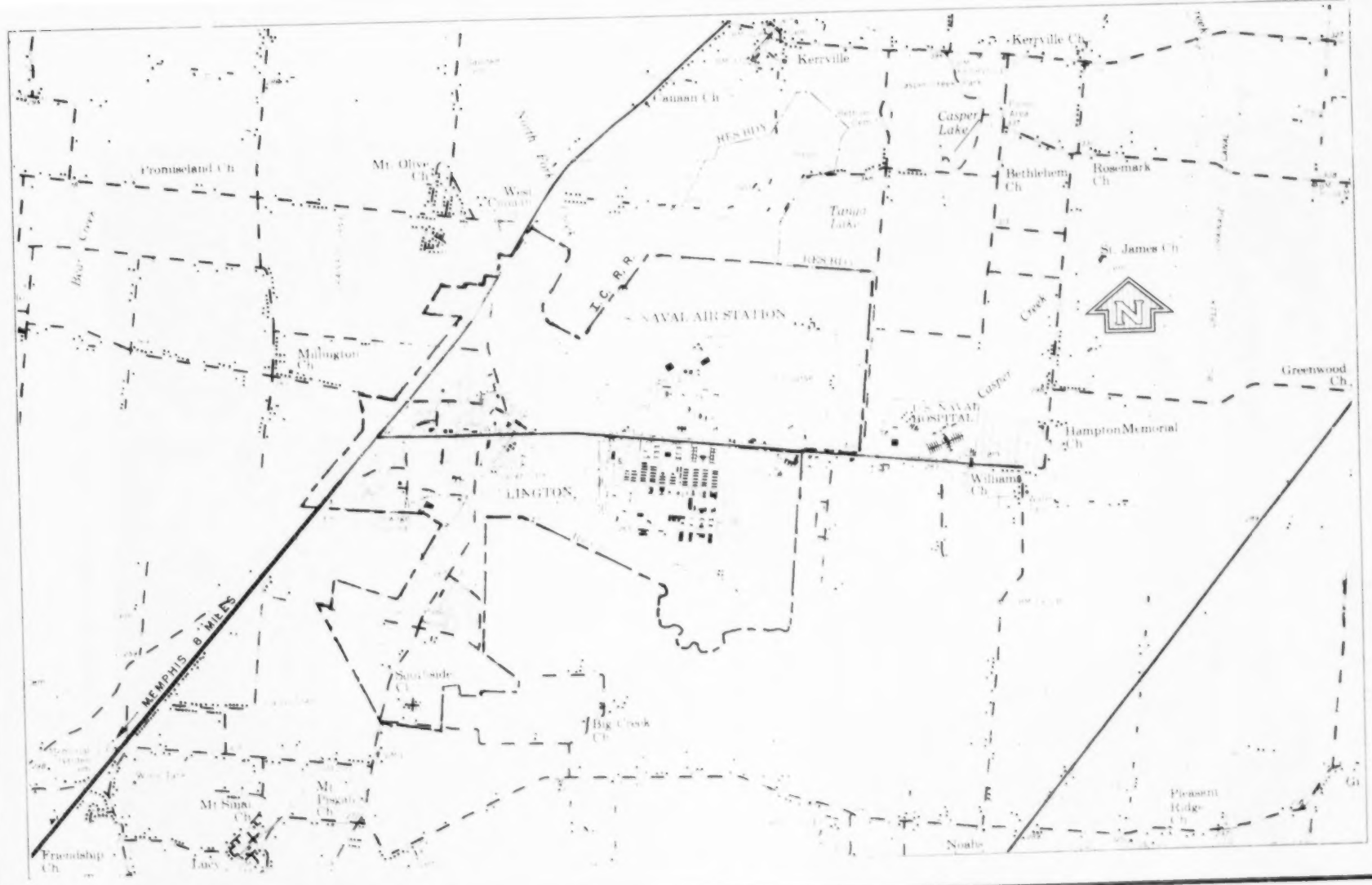


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Insurance Administration

CITY OF MILLINGTON, TN

(SHELBY CO.)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

With the exception of Big Creek Drainage Canal, most of Millington's flooding is a function of rainfall within the city. Flooding from Big Creek Drainage Canal could occur from rainfall in the upper Big Creek watershed to the east of the city.

There are no stream gage records available for any of the four streams covered in this report. High-water marks of past floods were obtained, residents along the streams were interviewed, and newspaper files were searched for information concerning past floods.

There are no official rainfall reporting stations within the Big Creek Drainage Basin. Rainfall records for the Memphis area are available from 1871 to present. During this period of record, the maximum rainfall in a 24-hour period at the Memphis rainfall station was recorded to be 10.48 inches occuring on 20-21 November 1934. Some of the more recent 24-hour rainfalls as recorded at the station are as follows: 4.94 inches on 8-9 May 1958, 4.63 inches on 21-22 September 1957, and 4.15 inches on 2-3 December 1964. The search for information concerning past floods revealed that the Millington Naval Air Station has recorded 4.77 inches of rainfall for a 24-hour period on 19 April 1973. Most of this rainfall resulted from a heavy downpour in the late afternoon and early evening. Figures 2 through 7 show some of the flooding resulting from this heavy rainfall.

EXCERPTS FROM THE MILLINGTON STAR

18 FEBRUARY 1965

Week of Rains Brings Flooding, Rescue Efforts

"Last week's near torrential rains brought flooding and destruction in the amount of many thousand dollars, as residents of some sections of the city were literally flooded out of their homes, said Tom Goins, Millington Fire Chief.

"Typical experience was that of 'B' Street residents, many of whom were forced to send for rescue as they waited, trapped by rising waters, with furniture floating around them . . . Mrs. Rapp Kennedy of 8020 'B' Street cited the action of Jim Tucker and Leonard and Ed Childress, assistant fire chiefs, who rowed out to stricken sections to move residents to safety. 'Judge Pruitt sent one boat, said Mrs. Kennedy, and the Fire Department sent another . . . .

"B Street was particularly hard-struck, said Chief Goins who commended his department for a 'fine job under pressure'. Most of the evacues salvaged essential belongings, but quite a few lost thousands of dollars worth of property, mainly in furniture, he said . . . Mrs. Kennedy, and most of the other evacues, are at home now, sizing up the damage and hope for the best in way of restoration. 'It won't be easy,' said Mrs. Kennedy. 'The floods really laid waste.'"

FIGURE 2: January 1969 flooding along Mayfield Creek.

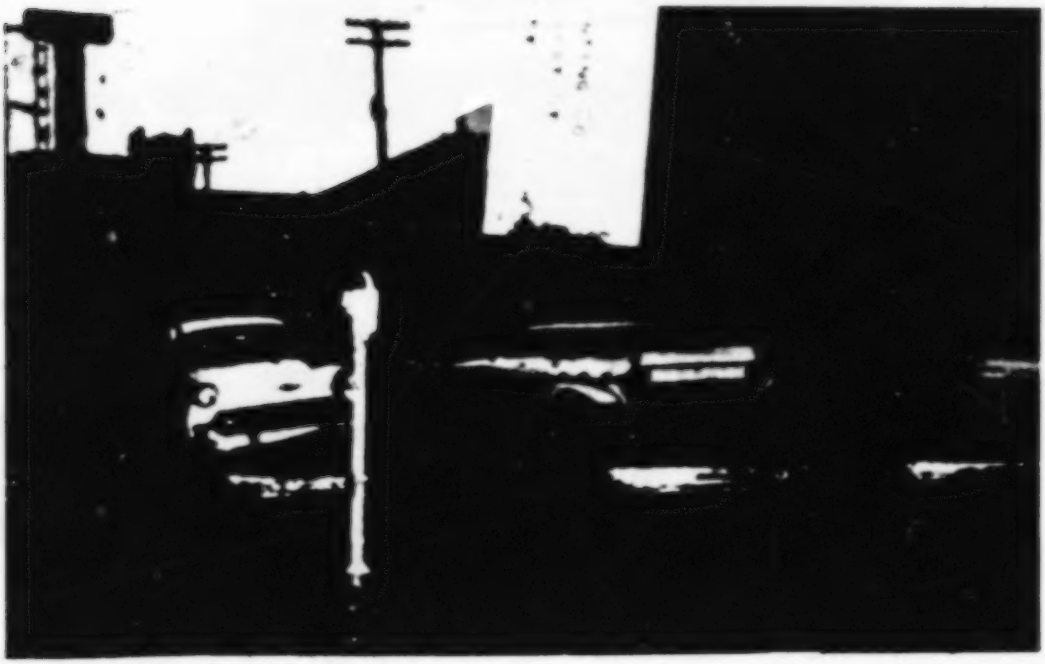


FIGURE 3: August 1959 Flash flooding in Business District.

FIGURE 4: Floodwaters of Big Creek Drainage Canal along Raleigh-Millington Road south of Millington, 20 April 1973.

FIGURE 5: Floodwaters of Big Creek Drainage Canal on south side of Millington Naval Air Station, 20 April 1973. (Official Photograph U.S Navy)

FIGURE 6: Floodwaters of Big Creek Drainage Canal on south side of Millington Naval Air Station, 20 April 1973. (Official Photograph U.S. Navy)

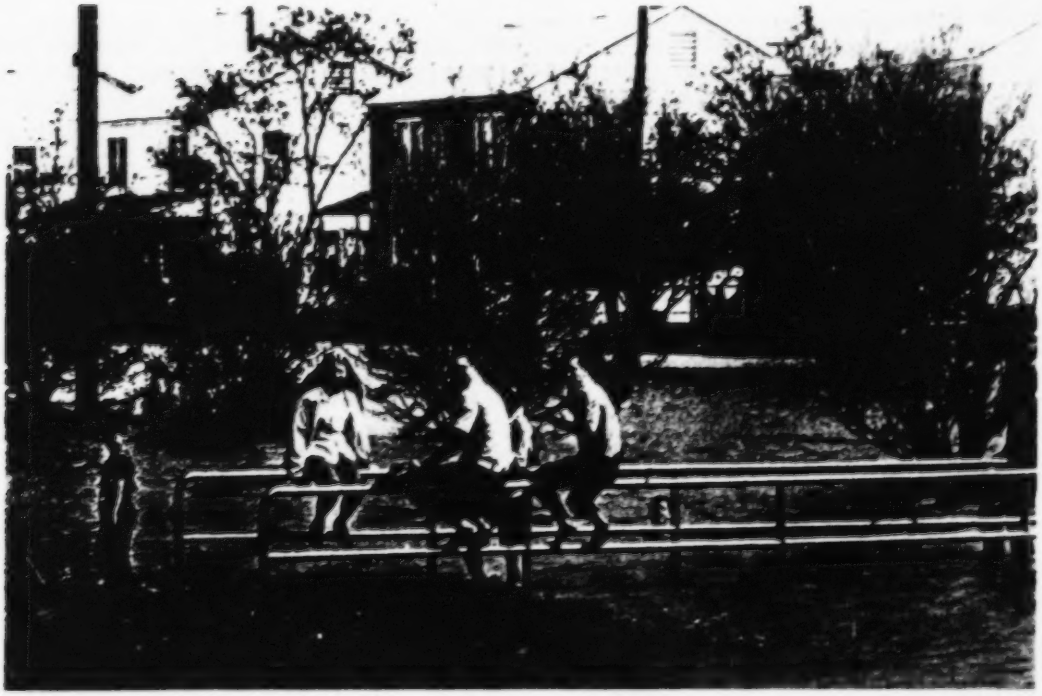


FIGURE 7: Floodwaters of Big Creek Drainage Canal in the vincinity of Millington Naval Air Station, 20 April 1973.

27 APRIL 1973

Damage Estimated Near Half Million

"Tornado and flood hit Millington last Thursday with a violence that left few families untouched from the onslaught. City streets ran like rivers, as water rushed into business and home alike.

"The tornado hit shortly after 10:00 a.m. Thursday morning, flattening several trailers at Westside Trailer Park. The flood waters rushed into the city from two directions Thursday eveining following some five inches of rain during the day.

"The first flooding came from the north side of town as the North Fork Creek overflowed its banks. What was shock was the sudden rush of waters over the city as a levee broke on Big Creek making a lake of the Southside of Naval Air Station, and flooding Millington downtown streets with up to three feet of water, as it rushed into most downtown buildings and in homes in Eastwood, new homes on Eastport behind Navy Road, and in the lower sections of Indian Meadows.

"Some 200 Marines were dispatched to Millington from Naval Air Station, to aid police, firemen, Sheriff's deputies, and Highway personnel, headed by Mayor Thomas Hall to give aid to stranded motorists, evacuate homes and provide boats for areas where other transportation was impossible.

"Mayor Hall estimated the loss to residents, washed out roads and bridges, and business losses up to a half million dollars, but stated, 'There is really no way this early to know what the figure will be, and it could well be over that estimate . . . .'

"Business along Navy Road from Church Street to Easley were hardest hit on that street, with those on 'C' and Easley Streets suffering equally. Every store building owned by Mayor Hall on the Navy road strip, and those of the Omar Pitts' were flooded as were builidngs belonging to the H.S. Mitchell estate, where the Star plant and offices are located, along with The Pit Stop and Quality Parts. Other store buildings along the strip suffered heavy losses. First National Bank had losses from water-soaking, and at one time it was reported that tires from Ragsdale's Service Station were "floating away". At the Star an estimated 40 tons of newsprint was lost as well as a large supply of other paper products. . ." (See Paragraph 2.4)

EXCERPTS FROM THE MEMPHIS PRESS-SCIMITAR
20 April 1973

River, Creek Overflowing in Area

"Approximately 7,000 military personnel and technical school workers at Millington Naval Air Base School were forced from classes today as water from the overflowing Loosahatchie River and Big Creek began covering the south side of the Navy Nase . . ."

"Damage was heavy on the Navy Base, and in other parts of Millington where many businesses and homes were flooded, water damaged equipment and soaked newsprint."

2.4 Flood Protection Measures

The City of Millington performed channelization and cleanout work on North Fork Creek during the summer of 1977. This work has diminished the effects of flooding on North Fork Creek by reducing the flood heights along the stream. The most dramatic effect of this work is in the vicinity of Church Street, C Street, Navy Road, and Easley Road, which frequently flooded prior to this work. The newspaper account of the flooding in April 1973 and Figure 3 illustrate the flood problems which existed in this area before 1977. The hydraulic analysis performed for this study indicates that this area is no longer susceptible to flooding caused by the overflow of North Fork Creek.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

Frequency-discharges were developed for the Big Creek basin using the COE HEC-1 Computer Program (Reference 1). The basin was divided into sub-areas, and synthetic unit hydrographs were developed for each sub-area using Snyder's Synthetic Unit Hydrograph method as described in EM 1110-2-1405 (Reference 2).

Rainfall frequency values were detemined from National Weather Services Technical Paper No. 40 for the 10-, 50-, and 100-year frequency rainfalls (Reference 3). A corresponding 500-year frequency rainfall was determined by extrapolating the 10-, 50-, and 100-year frequency rainfall depths for given durations. Rainfall losses for the Big Creek Basin were based on initial and uniform loss rates. The rainfall excess was applied to each unit hydrograph to obtain the flood hydrograph for each sub-area. The flood hydrographs were combined and routed using the modified Puls method.

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BIG CREEK					
Confluence of Royster Creek	109.2	16,121	20,167	22,285	27,000
Confluence of North Fork Creek	87.1	12,707	17,142	19,917	25,100
Confluence of Casper Creek	62.3	12,187	16,262	18,499	23,200
ROYSTER CREEK					
Mouth	18.2	7,122	9,172	10,016	12,200
NORTH FORK CREEK					
Mouth	17.1	5,984	7,516	7,996	9,350
Confluence of North Fork Creek Lateral A	15.1	4,860	6,130	6,661	7,800
NORTH FORK CREEK LATERAL A					
Mouth	3.4	2,146	2,679	2,913	3,425
CASPER CREEK					
Mouth	5.7	1,816	2,862	3,265	4,400

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the City of Millington were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Aerial photographs of the Millington area were flown in January 1976. Cross section data and spot elevations within the flood plains were obtained by field surveys in September 1972 and June 1976.

Locations of selected cross sections used in the hydraulic analyses are shown on Flood Profiles (Exhibit 1). The location and length of the cross sections are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Manning's roughness coefficients were estimated by field inspection and ranged from 0.035 to 0.085 for earth channels and from 0.05 to 0.09 for overbank areas.

Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals (Exhibit 1). Water-surface profiles were developed using the COE HEC-2 Computer Program, "Water-Surface Profiles" (Reference 4). This program uses the backwater standard step method for natural channels and contains elaborate routines for evaluating head losses at bridges and culverts. Starting water-surface elevations were computed using the slope-area method.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference mark data, including both existing bench marks and other significant elevation reference marks developed during the study, are shown and described on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using a topogrphic map at a scale of 1:12,000 with a contour interval of 10 feet (Reference 5). These contours were adjusted and added where necessary to obtain agreement with the field surveyed cross sections and spot elevations. In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100-year and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore, not be subject to flooding; owing to limitations of the map scale, and/or topographical data, such areas are not always shown. Also, along the outer limit of the flood boundaries, delination of the flood outlines may be in slight error due to the accuracy of the topographic data.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways proposed for this study were computed on the basis of equal conveyance reduction from each side of the flood plain. Floodway widths were chosen to minimize the amount of land area required for passage of a 100-year flood flow. The results of these computations are shown in Table 2.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 8.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Big Creek Drainage Canal								
A	8.45	180	2,407	8.3	257.4	257.4	258.4	1.0
B	8.90	1,435[2]	15,734	1.3	259.0	259.0	259.8	0.8
C	9.38	167	3,363	5.9	259.2	259.2	260.2	1.0
D	9.60	175[2]	3,315	6.0	260.9	260.9	261.7	0.8
E	10.00	2,033[2]	11,473	1.5	262.7	262.7	263.5	0.8
F	10.62	1,143[2]	5,307	3.5	264.0	264.0	264.9	0.9
G	11.32	1,729[2]	8,767	2.1	267.1	267.1	268.1	1.0
H	11.80	1,690[2]	6,625	2.8	269.0	269.0	270.0	1.0
I*	12.46	2,662	11,131	1.7	272.9	272.9	273.9	1.0
J*	13.03	4,370	12,715	1.3	275.3	275.3	276.3	1.0

[1]Miles above mouth
[2]This width extends beyond the corporate limits
*Outside Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOODWAY DATA

BIG CREEK DRAINAGE CANAL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Royster Creek								
A*	0.06	100	1,180	8.5	255.0	241.9[2]	242.9	1.0
B*	0.61	100	922	10.9	255.0	253.6[2]	253.6	0.0
C*	0.98	120	1,746	5.7	259.8	259.8	260.8	1.0

[1] Miles above mouth
[2] Water-surface elevations determined without considering backwater effects
* Outside Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOODWAY DATA

ROYSTER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT)	SECTION AREA (SQ FT)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
North Fork Creek								
A	0.13	100	1,054	7.6	262.0	253.4[3]	254.4	1.0
B	0.40	90	1,003	8.0	262.0	256.8[3]	257.2	0.4
C	0.65	120	1,412	5.6	262.0	259.1[3]	259.3	0.2
D	0.87	170	1,281	6.1	264.6	264.6	264.8	0.2
E	1.13	80	703	9.5	267.1	267.1	267.8	0.7
F	1.26	60	640	10.4	270.0	270.0	270.2	0.2
G	1.51	150[2]	1,141	5.8	274.4	274.4	274.4	0.0
H	1.83	1,780[2]	3,401	1.2	276.0	276.0	276.0	0.0
North Fork Creek Lateral A								
A*	0.48	325	1,061	2.7	276.0	272.6[3]	273.6	1.0
B*	1.39	1,680	2,516	1.2	287.7	287.7	287.7	0.0

[1] Miles above mouth
[2] This width extends beyond corporate limits
[3] Water-surface elevations determined without considering backwater effects
*Outside Corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOODWAY DATA

NORTH FORK CREEK–NORTH FORK CREEK LATERAL "A"

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Casper Creek								
A*	0.09	60	445	7.4	273.9	272.0[2]	273.0	1.0
B*	0.47	560	2,140	1.5	276.3	276.3	277.1	0.8
C*	1.05	70	495	9.1	283.8	283.8	283.8	0.0
D*	1.21	910	3,460	1.3	284.7	284.7	284.9	0.2
E*	1.94	465	1,865	1.5	291.2	291.2	292.2	1.0

[1]Miles above mouth
[2]Water-surface elevations determined without considering backwater effects
*Outside Corporate Limits

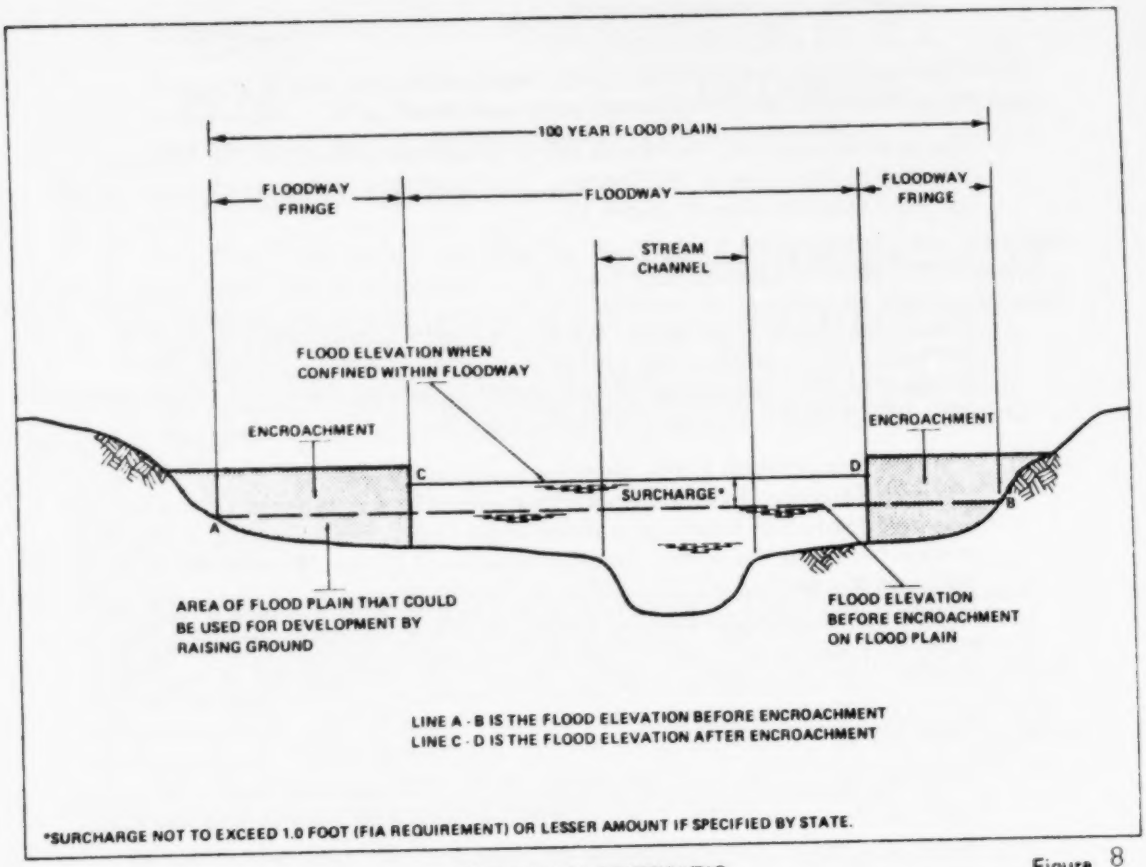
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOODWAY DATA

CASPER CREEK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 8

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the City of Millington.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot

Six reaches meeting the above criteria were required for the flooding sources of the City of Millington. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Millington was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zones A1, A3 A5, A6, A8:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevation for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Millington is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

This Flood Insurance Study was made in conjuction with the Wolf and Loosahatchie Rivers and Nonconnah Creek, Tennessee and Mississippi Feasibility Report, and the Memphis Metro Area Study. The Department of Housing and Urban Development, FIA, issued a Flood Hazard Boundary Map for the City of Millington in August 1976 as the result of an approximate flood hazard study (Reference 6). The approximate study is to be superseded by the results of this detailed flood hazard study. This detailed study findings support some of the approximate flood hazard areas mapped, but contradicts others.

A Flood Plain Information Report was published by the Memphis District in August 1974 on Big Creek and Tributaries in the vicinity of Millington. The flood elevations presented in this report differ from the Flood Plain Information Report because of increased urbanization and channel improvements.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the office of the Federal Emergency Management Agency, Insurance and Mitigation Division, 1375 Peachtree Street, N.E. Atlanta, Georgia 30309.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Big Creek Drainage Canal							
Reach 1	0005	-4.2	-1.0	+1.8	040	A8	Varies
Reach 2	0005	-2.8	-1.1	+1.2	030	A6	Varies
Reach 3	0005	-1.6	-0.4	+0.6	015	A3	Varies
Royster Creek							
Reach 1	0005	-3.0	-1.0	+2.0	030	A6	Varies
North Fork Creek							
Reach 1	0005	-2.3	-0.7	+1.0	025	A5	Varies
North Fork Creek Lateral A							
Reach 1	0005	-0.5	-0.3	+0.3	005	A1	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT SEE MAP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOOD INSURANCE ZONE DATA

BIG CREEK DRAINAGE CANAL-ROYSTER CREEK-NORTH FORK CREEK-NORTH FORK CREEK LATERAL "A"

8.0 BIBLIOGRAPHY AND REFERENCES

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2. U.S. Army, Corps of Engineers, Flood Hydrograph Analysis and Computation, 31 August 1959.

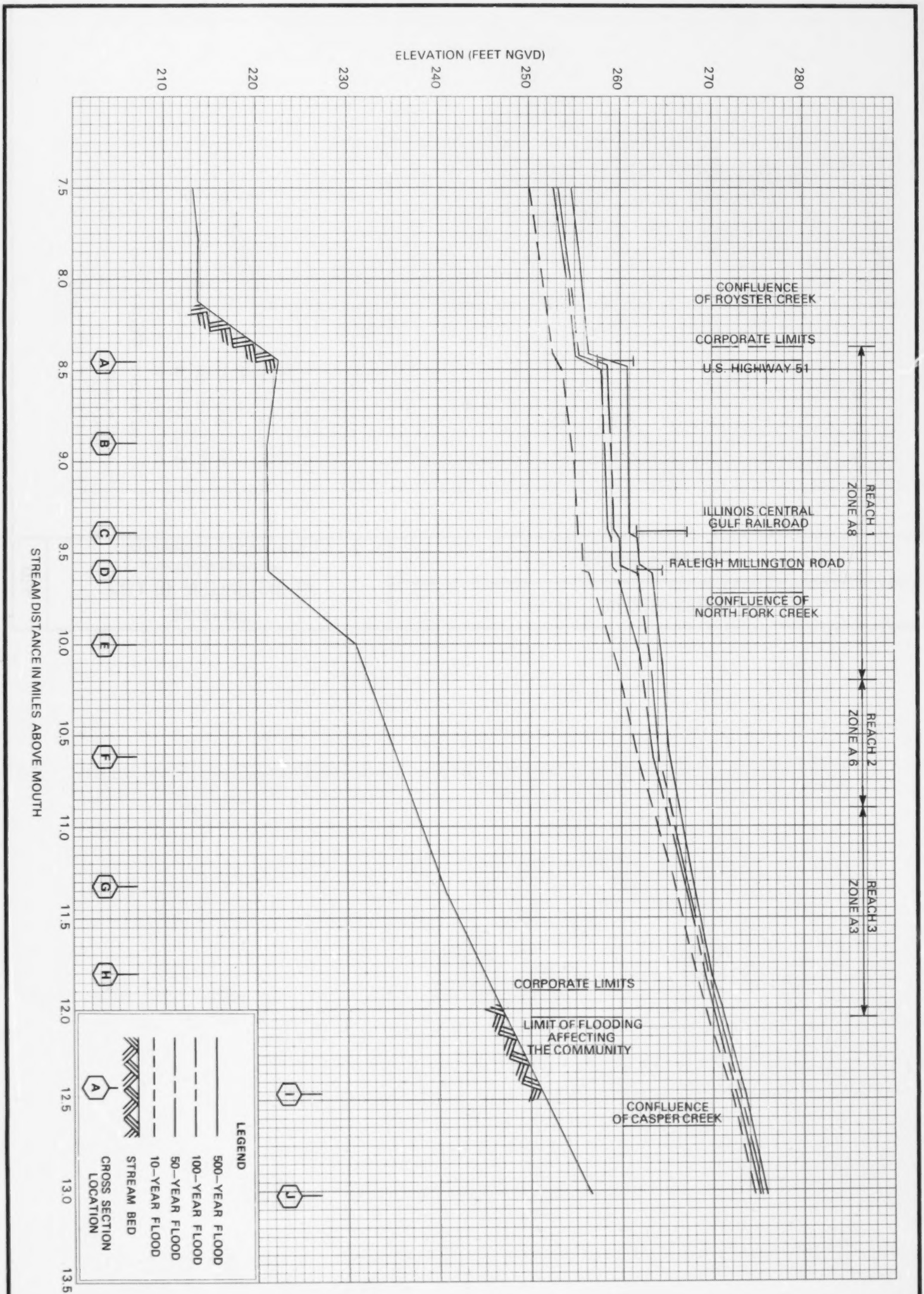
3. U.S. National Weather Service, Technical Paper No. 40, Rainfall Intensity Duration Frequency Curve, U.S. Government Printing Office., Washington, D.C. 1961.

4. U.S. Army, Corps of Engineers, "Computer Program HEC-2 (1973)", Davis, California.

5. U.S. Geological Survey 7.5 Minute Series Topographic Map: Millington, Tennessee (1960).

6. U.S. Department of Housing and Urban Development, Federal Insurance Administration, "Flood Hazard Boundary Maps for the City of Millington, Shelby County, Tennessee," August 1976.

   U.S. Department of Housing and Urban Development, "Flood Insurance Study Guidelines and Specifications". (October 1977).



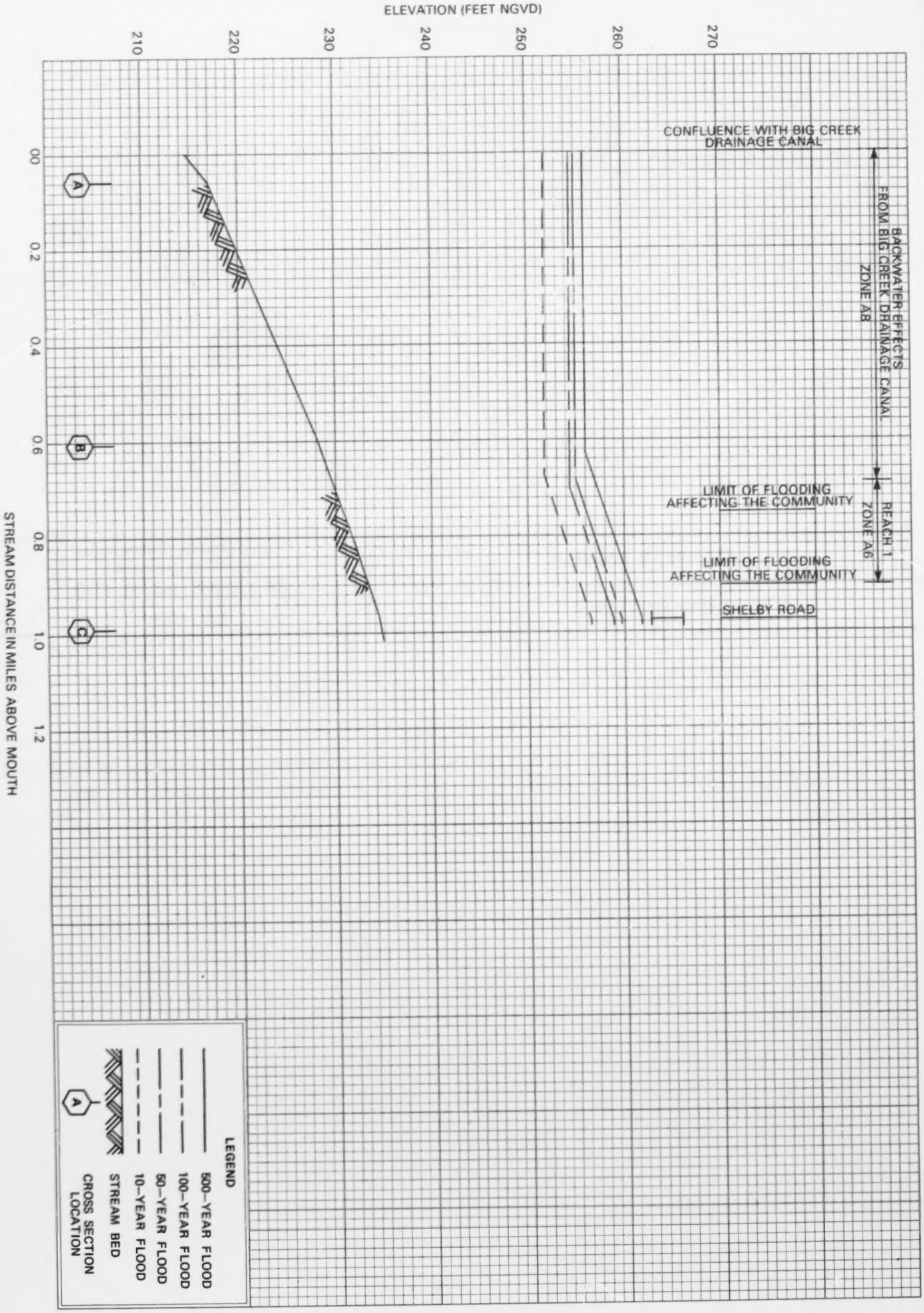
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOOD PROFILES

BIG CREEK DRAINAGE CANAL

01P



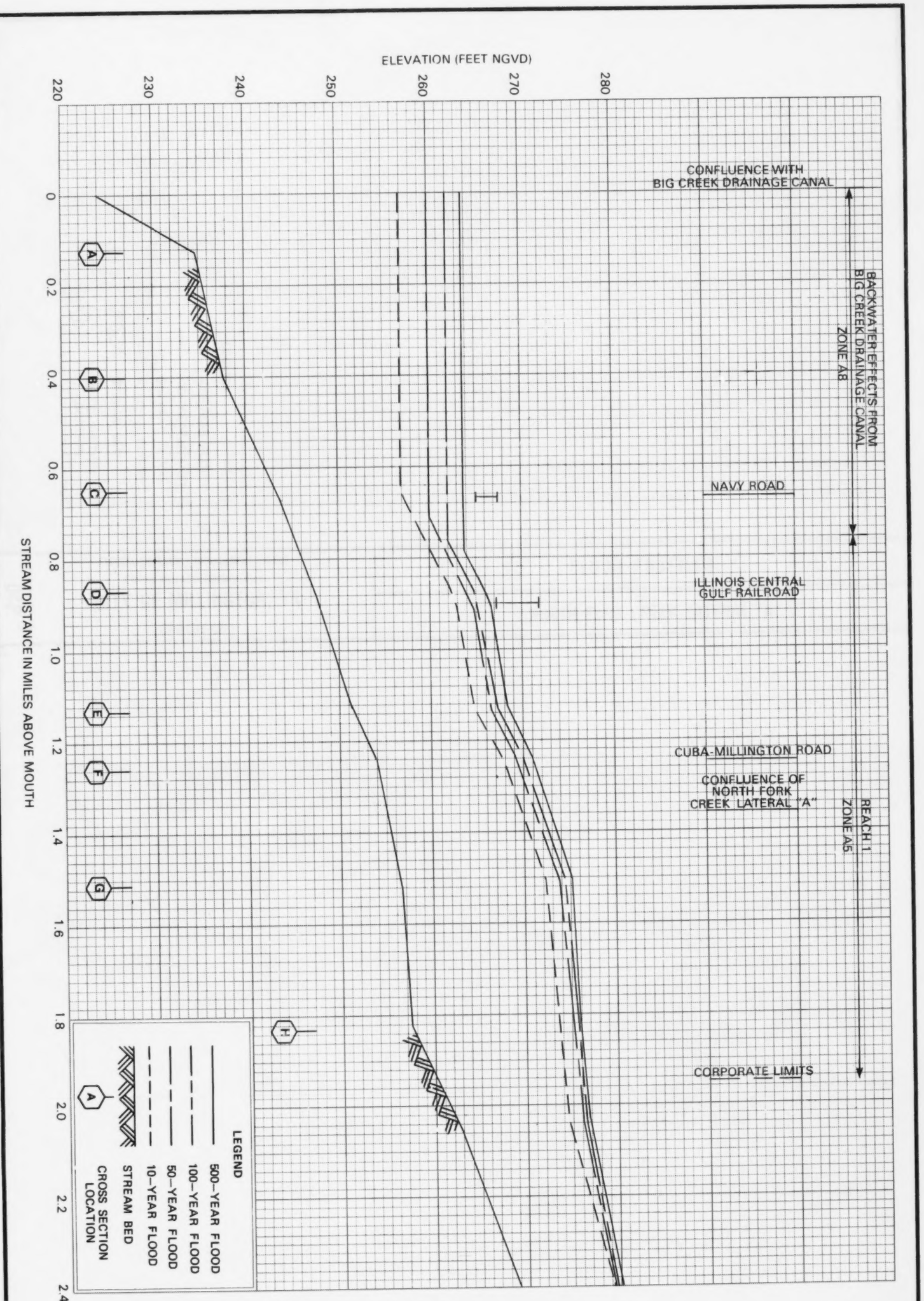
02P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOOD PROFILES

ROYSTER CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

FLOOD PROFILES

NORTH FORK CREEK

03P

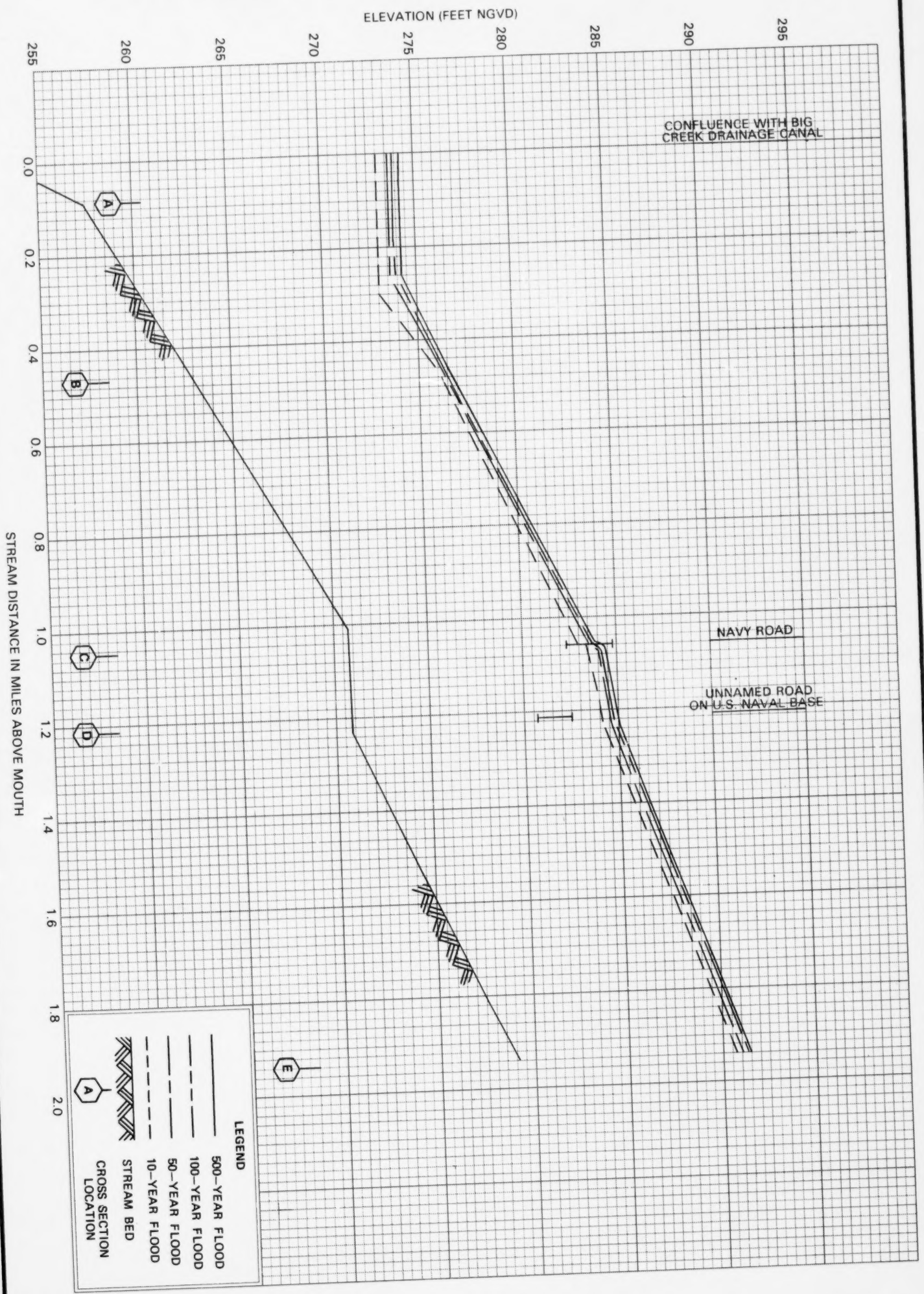
FLOOD PROFILES

NORTH FORK CREEK LATERAL "A"

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MILLINGTON, TN
(SHELBY CO.)

04P



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FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Insurance Administration

CITY OF MILLINGTON, TN

(SHELBY CO.)

FLOOD PROFILES

CASPER CREEK